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The theory of evolution and its implications

How some misunderstandings concerning evolution can lead to confusing philosophical claims?

Abstract

There are three main purpose of the presented paper. Firstly, the presentation of the most common fallacies concerning the theory of evolution and its implications on the fields of ethics and metaphysic. Secondly, the undertaking of trial leading to the elucidation of the most crucial concepts of evolutionary process. Thirdly, presentation of some pivotal issues connected with the interpretation of the theory of evolution.

The Author begins with the cursorily presentation of the misunderstandings rooted in the tradition of Aristotle formal cause and Kant's teleonomy. Presented arguments demonstrate that teleological interpretations are inconsistent with the evolutionary framework of modern biology. Subsequently positions of Lamarckism and saltacionism are analyzed to illustrate some misunderstandings connected with the historical forms of evolutionary debates. At the end basis of evolutionary ethics and its reception is examined.

Commonsense knowledge: a guide or a false friend?

When somebody makes a statement that explaining quantum theory is a much simpler task compared to the theory of evolution, one very often finds this conclusion at least dubious or suspiciously counterintuitive. However after a cursorily analysis the subject becomes more and more clear. The most obvious reason for that is probably the mediation of commonsense knowledge which, though very helpful in everyday life, is a very fertile reservoir of superstitions, simplifications and misunderstandings. A vigilant reader probably raises the question which would sound like that: how can we discuss the mediating role of commonsense in the field of quantum mechanics at all given that commonsense knowledge can tell us literally nothing about the main concepts of quantum mechanics? A good point. For this reason quantum mechanics is very rarely a source of misunderstanding – simply because of a lack of any pre-understanding. Unfortunately the theory of evolution is quite different a matter. The concept of evolution itself, adaptation, survival of the fittest, species and a few other notions, which a typical person is acquainted with, are living a double life among the academics and participants of popular culture. What makes the matter worse is that the resultant misunderstandings concerning the theory of evolution do not affect only its core components but are a lot more harmful for its implications in field of ethics, social life, religion, and biology in general, to mention only the most crucial areas.

When asking about associations connected with evolution one's must be aware of the possibility of receiving such terms as 'general progress', 'the approaching of perfection', etc. as an answer. Teleological interpretations of evolution are most common but rarely possess a clear meaning. It is generally known that *Archaeobacteria* were first cellular life-forms; we know something about the dinosaurs and we know that now mammals are the most complex organisms on the Earth but rarely we are aware of the process which allowed life forms to transform into one another during the period of the last 3,5 billion years. On this very stage first obstacle arises. Very often the process of

evolution itself is treated as a teleological one. Why more and more complex organisms have evolved? Because the Nature is heading towards the greater perfectness and the Man is a cumulative point of this process, sounds the very common answer. Few obvious reasons for that are: struggles to reconcile the faith and science which, at least on the field of evolution, are as fruitful as they are confusing and the natural tendency to adapt teleonomy as a tool for examining processes outside the human consciousness. As far as we know intentionality and goal-directed thinking (or according to some skeptics wishful thinking) are unique features of human being and saying that Nature wants or desires something is either a metaphor or a dubious anthropomorphisation.

Aristotle and Kant on purposes in Nature

The origin of teleological thinking can be found in the pre-philosophical religion systems but thanks to ancient Greek philosophy it entered our cultural heritage. To mention only two most influential thinkers – Aristotle and Kant – whose systems included vision of goal-orientating life sciences. According to Aristotle each kind has its own final cause (among three others: causal, material and formal) and entities are constructed in such a manner that they tend to realize the goal embodied in them. Plant final cause includes a natural tendency to reproduction and growth whereas animals also tend to precept and experience things. The final cause of the human being include also the thinking and social behavior. Kant on the other hand greatly influenced life science from the epistemic point of view. The concept of external and internal purposiveness in Nature presented in *Critique of Judgment* is very sophisticated trial of Philosophy of Biology opposing to Kant's contemporaries (mostly mechanics schools) but, unlike them, Kant's work demands a great effort to be properly understood because of specific terms and crucial connection with the previous works. External purposiveness assumes that various organism can be regarded as being designed for some purpose and is something which is quite similar to traditional teleological thinking. Unlike external, internal purposiveness

assume that every part of organism is designed in the accordance with the need of the whole and is more alike modern functional thinking. Kant did not sympathize with any of this conceptions more that with another and is only making some distinctions. [Wicks 2007, 185-188] He only assumes that both kinds of thinking are present in our experience and posses a status of *a priori*. It is worth to mention also a P. Teilhard de Chardin – paleontologist and Jesuit priest – whose conception of combining evolution with some elements of philosophy (mostly taken from Aquinas and Bergson) and natural theology resulted in the view of evolution as a finite process heading the Omega-point. A few cited examples are only a few representative ones which are still alive and have influenced cultural stereotype of evolution.

Evolution without teleology

In contrast to the positions cited above the contemporary view of evolution assumes no teleological elements. Evolution is simply a result of adaptation to the changing environment and has no purpose. A very popular argument which in various forms is applied to prove difficulties in evolutionary framework of modern biology is called the *watch analogy* and goes like that: suppose you have found a watch on the beach and you know that you are a first human being on that particular beach. Do you assume that watch has created itself in the evolutionary process from rock, sand and water or rather you would suppose that it has been assembled by its creator in a particular purpose? This and similar argument has been created to struggle with XIX century mechanicism in science and philosophy and fight with its own weapon assuming no real difference between animated and non-animated objects. A watch could not assembly itself for sure because it is a non-animated object and has no life characteristics including for example lack of possibility to transfer genetic information of any kind which is a crucial element for the process of reproduction both sexual and asexual. There is also a very important difference between functions of watch and the functions of living organism. In the first

case function has been correlated with the need of its creator i.e. measuring time to say that literally, whereas in the second case function of every life organism has been adapted to only one purpose – the survival. One could ask why organisms are characterized by such a great complexity whereas simple anaerobic bacteria are able to survive? An answer is very complex. To give only a draft answer one could say that a main role plays a principle of conservation of energy and the second law of thermodynamics. More complex organism has usually a longer lifespan than a unicellular one and uses less energy than for example a colony o bacteria with corresponding number of cells. Moreover a sexual reproduction, which is far more effective than asexual one, because of mechanism which increase the probability of eliminating genetic failures and transferring desirable features in the process of meiosis (in asexual reproduction cells simply creates their copies), is another advantage over simpler organisms.

Evolution is an adaptational process and it cannot be regarded as an always leading to the greater complexity. Very often some traits of organisms deteriorate because of lack environmental stimulus. When nutrients are abundant and organism has no natural enemy it often lacks e.g. sharp senses, great speed or camouflage. Members of the dove family have mostly ability to fly as the family ancestors but one of the species **a dodo**, native to Mauritius, feeding exclusively on **dodo tree**, is devoid of this ability which at first glance seems to be deterioration but his traits are also a result of evolutionary process. [Kitchener, 1993]

Very often another key term – *natural selection* – taken literally is a source of teleological mirages. Term selection brings to one's mind a thought that there must be a selector. This is the case when domesticated plants or animals are considered because of an intervention of breeders are not heading towards survival-adapting traits but towards traits beneficial to breeder i.e. extensive milk or meat production or simply a look which fits canons of aesthetics if we are regarding some species of cats or dogs. But this is not the case when we are analyzing adaptational processes without artificial intervention.

Natural selection should be examined on at least population level. Assuming a limited amount of resources and/or presence of natural enemies we can suppose that certain organisms have a different survival rate because of certain traits they genetically possessed. Different survival rate means that organism with certain features, which allows them to cope with environment in a more effective way, probably have a higher probability to transfer their genes and to increase the number of individuals possessing certain traits. [Mayr, 2002, 107-109] This does not mean that individuals without certain adaptation must instantly extinct during the lifespan of few generations but rather that the number of individuals with certain adaptation tends to increase and the number of individuals without it tends to decrease. In very large population some undesirable traits cannot be definitely eliminated because of e.g. support of other individuals from that particular population.

What the term survival of the fittest really means?

Within the evolutionary framework the fittest individual is the best-adapted one. And as was mentioned above *adapted to certain environment* is a relative term because there is simply no possibility to enumerate traits which can designate the fittest individual independently of an environment. Let analyze some examples. Cheetah is very vulnerable to the lack of nutrients because he cannot store fat in large amounts. Large fat reserves would possibly hinder his hunting abilities. In the opposite manner large amounts of fat tissue are crucial for e.g. brown bear which very rarely must chase his victim. When his hunter abilities deteriorate because of abundance of fat he can simply change a strategy and hunt fishes or gather some plants. However large fat reservoir is for him a matter of be or not to be during the winter months. [Kleiman, Geist, McDade, 2003, 381-382]

Various ideologies and philosophical currents like neodarwinism or social darwinism took for granted the absolute meaning of *survival of the fittest* where the

notion of fitness and e.g. physical endurance or mental capacities were often considered equivalent. Moreover a matter of applying evolutionary framework beyond life sciences is a very problematic one because of such a factor as intentional behavior of individuals which are not a case when animal behavior is considered.

Saltacionism and Lamarckism

Many misunderstandings concerning the theory of evolution are connected with the historical debates over evolution during the last 150 years. One of them concerns the status of so called transmutative evolution or saltacionism. This view assumes that between two generations of the species a mutation is possible that can even mark off a new species. This view was very popular in the end of XIX century and subsequently was discredited by gradualism but in recent years the matter appeared to be more complicated. Organism form kingdoms: *Monera, Protisa, Fungi* and even some *Plantae* are under the strong influence of non-genetical modifications which hinder the effect of natural selection. The more *plastic* the phenotype the less important natural selection becomes. This does not mean that e.g. bacteria are not under the influence of natural selection. They are, and that can be easily observed in hospitals where very virulent strains of bacteria develops because they were previously treated by some antibiotics which killing the whole colony gave a life space to bacteria with immunity to that certain medicine. But unlike higher organism they are also very prone to spontaneous mutation. The pressure of natural selection among animals also varies but non-genetical factors play a minor role. For obvious reason specialist are under stronger pressure of natural selection than generalist because of their less-developed adaptational abilities but traits which designate generalist or specialist are themselves determinate by natural selection. [Gould, 2002, 105-109]

Among higher animals the saltaciositic view has little application. Very often in favor of this view a case of industrial melanism is raised but very often it is also quite misinterpreted. The industrial melanism is a phenomenon of the correlation between the color of the moths and the pollution rate of their natural environment. In highly-industrialized regions moths with vivid colors have a less survival rate because of the lack of camouflage. This same consequently applies to dark-colored moths living in the less-polluted regions. In both cases natural selection *prefers* only individuals with certain color which protect them from the possibility of being spotted by insectivore birds. Because of the fact that industrial revolution in England began only about a quarter of millennium ago the argument was raised that the industrial melanism *argues* in favor of saltacionism and discrete vision of at least some parts of the evolutionary process. But foremost this argument fails to take into consideration the fact the rate of evolutionary processes depends on the duration of life cycles of certain organism. *Arthropode* generally and *Insects* particularly have a very short life cycle and consequently the effect of natural selection can be seen after a relatively short period of time. [Majerus 1998, 23-24]

In the other hand Lamarckism do not concern the rate of evolution but rather the way traits are transmitted from one generation to another. According to Lamarck view, expounded in the *Philosophie Zoologique*, traits can be acquired through phenotype and subsequently transmitted to offsprings. The reason for that giraffe has a long neck is that its ancestors have stretched their necks to reach for leafs on the higher branches. But Darwin proposal is a simpler one. Darwin is on the position that the natural selection plays a crucial role in the process of acquiring traits. According to him giraffes with longer neck were able to reach more leafs and consequently had a higher survival rate because of the sustenance abundance. The higher survival rate of the long-necked giraffe means that suitable traits has a greater chance to be transmitted and as the final result the number of long-necked giraffe increased. This repetitive process has created a modern giraffe within the space of about 50 million years. Biochemistry as well seems to prove against Lamarckism because of the discovery of chemical processes which are responsible for the

transmission of genetic information from genotype to phenotype. Inheritance of acquired characteristics is prevented by chemical barriers. The only way of changing the genotype during the life-span of individual is a mutation either spontaneous or cause by exterior factors like radiation, chemical substance or even pathogens.

Evolution and ethics

At the first glance evolutionary ethics seems to be a weird chimera joining two orders of reality evolving organisms and unchanging world of values. The is-ought problem which has shaped the modern view on ethics demonstrate difficulties which inevitably occur when one wants to infer moral judgments form facts such as evolution. How science like biology can tell us something about our moral duties and values? But maybe this problem is given in improper manner. Cartesian ideal reliability of knowledge has accustomed us to thinking in either-or categories. Deeply rooted in European culture the Christian paradigm of morality which operates with dual distinctions like deed and misdeed has only strengthened this mode of thought. Naturalistic approach to morality accepts different position. Fallibilism a hypothetism can be applied not only to the science but also to the morality. [Walter 2006, 33-48] Why cannot we put a hypothesis about certain value, its place in value-hierarchy and relation to different values? We do not posses an absolute-reliable criteria of science and non-science but we delude ourselves that we posses a reliable criteria of good and evil. Why we cannot think of moral judgment as a moral hypothesis?

Evolutionary ethics is based on the assumption that our moral judgment like the whole of our mental life can evolve and at least partially is based on our biological dimension. This does not mean that the world of values is changing (but we cannot exclude that if we stay on the naturalistic position) but rather puts accent on the

supposition that our moral cognition is evolving like simply other mental abilities. [Katz 2000, 87-89]

Is evolutionary ethics a trial of constructing a new kind of biological reductionism? This can be doubted for two principal reasons. Firstly, even if we assume so this do not instantly mean that a fallacy would have been accepted. Reduction has a methodological application and very often is the only way to understand partially something that cannot be comprehended as a whole. Mechanicism in life-science was a reduction implying few fallacies but it showed a way to biochemistry and contemporary biology. Secondly, acceptance of evolutionary ethics do not imply that ethical phenomena should be explained in terms of kin selection and inclusive fitness exclusively but rather suggests that this evolutionary processes gives us a partially explanation of altruistic behavior. [Buss 2005, 765-766] A cultural factor present in morality leads to development of relations which probably cannot be explained by biology exclusively but this for sure does not mean that it has a supernatural origin.

Summary

The main purpose of this paper was not a detailed discussion of philosophical problems connected with evolution but rather an outline of a few topics concerning common misunderstandings of evolutionary process and its implications. Even this brief sketch can demonstrate that these misunderstandings are mostly connected with our common knowledge witch do not harmonize with e.g. the rejection of teleology of Nature or naturalized ethics.

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